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Economic Benefits of Forming and Participating in a Water/Wastewater Agency Response Network (WARN)

September 2008

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ECONOMIC BENEFITS OF FORMING AND PARTICIPATING IN A WATER/WASTEWATER AGENCY RESPONSE NETWORK (WARN)

INTRODUCTION

Since March 2006, the national success of creating Water Wastewater Agency Response Networks (WARNs) in each state is undeniable. At that time, four states (California, Florida, Louisiana and Texas) were the only states to have a viable agreement in place as a method of exchanging personnel, equipment and other resources during response to an emergency. As of May 2008, twenty-five states have executed agreements to form a WARN program, with multiple states close behind in various states of “readiness” with draft agreements. While the success is evident, and the request for creating more is present, the business case, integration and practicality need to be documented. As a result, AWWA initiated a study of the economic benefits of participation in WARN to utilities, which has resulted in this report.

The purpose of this report is to provide a simplified, general reference for business case analysis of participating in a WARN in order to guide utility managers and decision-makers. It provides valuable insights into the strategic context, potential benefits and outcomes, costs and resource implications for WARN

signatories in enabling a utility to respond to various types of incidents.

This report is based on the results of a literature review, survey of utilities, and guidance from utility managers to help characterize the typical emergency response practices and experience, as well as the economic impact on utilities as they prepare for and respond to emergencies using mutual aid and assistance. It also includes valuable case studies of actual benefits experienced by three utilities in response to WARN activation.

LITERATURE REVIEW

Because WARNs are relatively recent in formation, there were limited examples of formal activation of a WARN and associated benefits at the time that the literature review was conducted in early 2007. In fact, no examples of documented, formal identification of the economic benefits of WARN to a utility were found. As a result, the survey was

expanded to allow identification of general experience with mutual aid experience and emergency response planning. The survey data was used to develop the report findings and gather information about economic costs and benefits, and insight into utility expectations about the value proposition of WARN.

SURVEY RESULTS

A comprehensive survey instrument was developed with the project committee members. The survey was administered using Zoomerang, a web-based survey tool. The survey was posted at a specific link on the Zoomerang web site. AWWA WARN Coordinator Kevin Morley distributed the survey electronically to over 400 contacts. The survey was open from May through July 2007. Seventy-nine utilities responded to the survey. The distribution of responses is shown in Figure 1 below.

knowledgeable about the benefits of mutual aid. The detailed results from this survey are presented in Appendix A.

The survey was not intended to be statistically significant but rather to gather facts and opinions from utilities that likely were the most

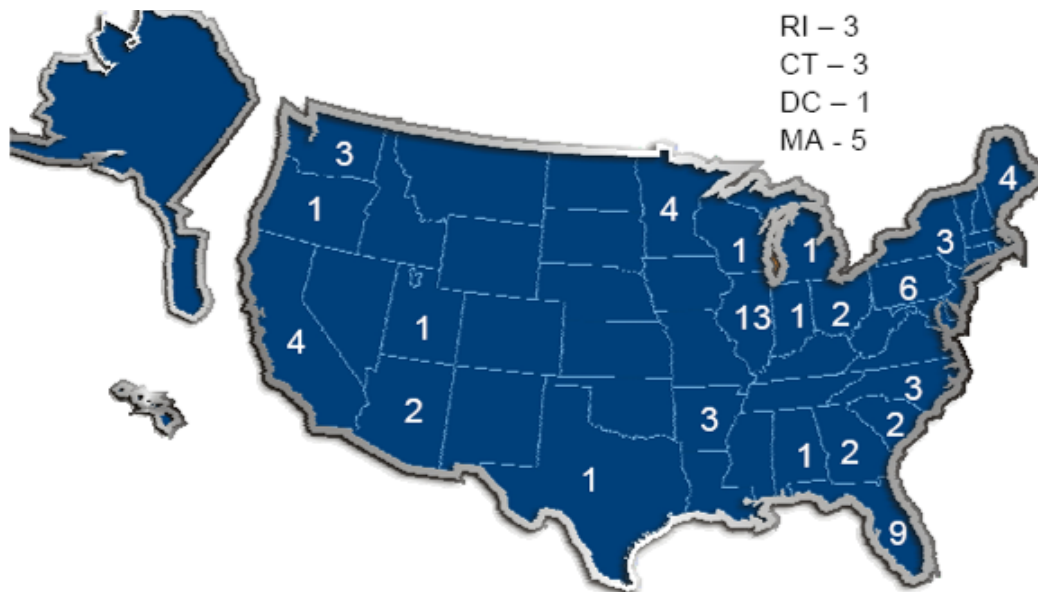


Figure 1: AWWA Survey Responders Locations

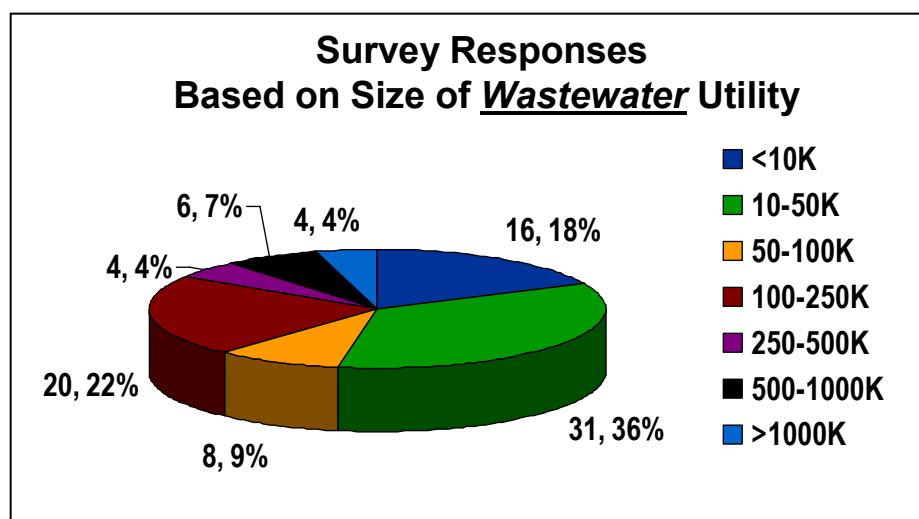
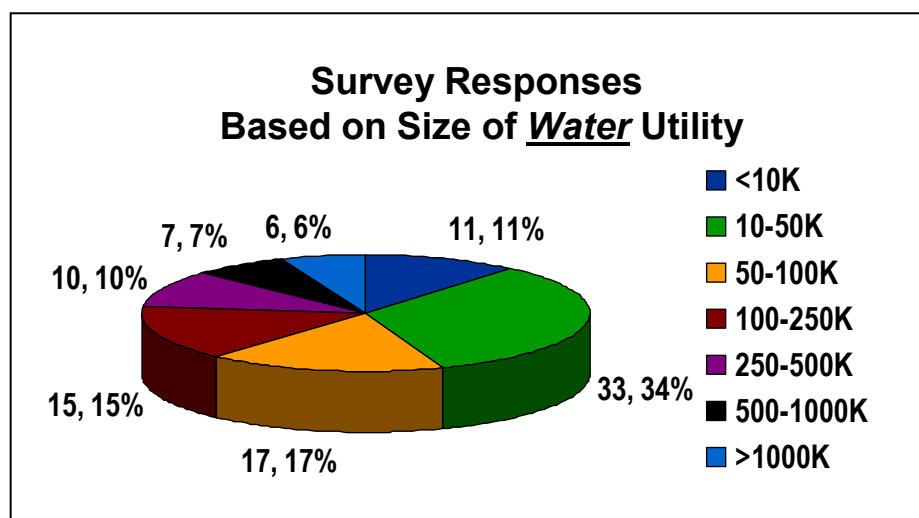


Figure 2: Survey Results – Population

Some highlights from this survey include:

- The size of utility responding to the survey ranged from less than 10,000 population served to over 1,000,000 or more, in either a retail or wholesale capacity. Therefore, a wide variety of sizes and services responded to the survey.
- Fully 95% of respondents were aware of WARN, and 95% were

familiar with the National Incident Management System (NIMS). Significantly, 81% fulfilled or intended to fulfill the 2007 NIMS compliance system requirements, which is a requirement in order to be eligible for grants from the Department of Homeland Security. (Note that more information on security project funding opportunities can be found in AWWA's report, *Security Funding Opportunities: Lessons Learned & Observations from Successful*

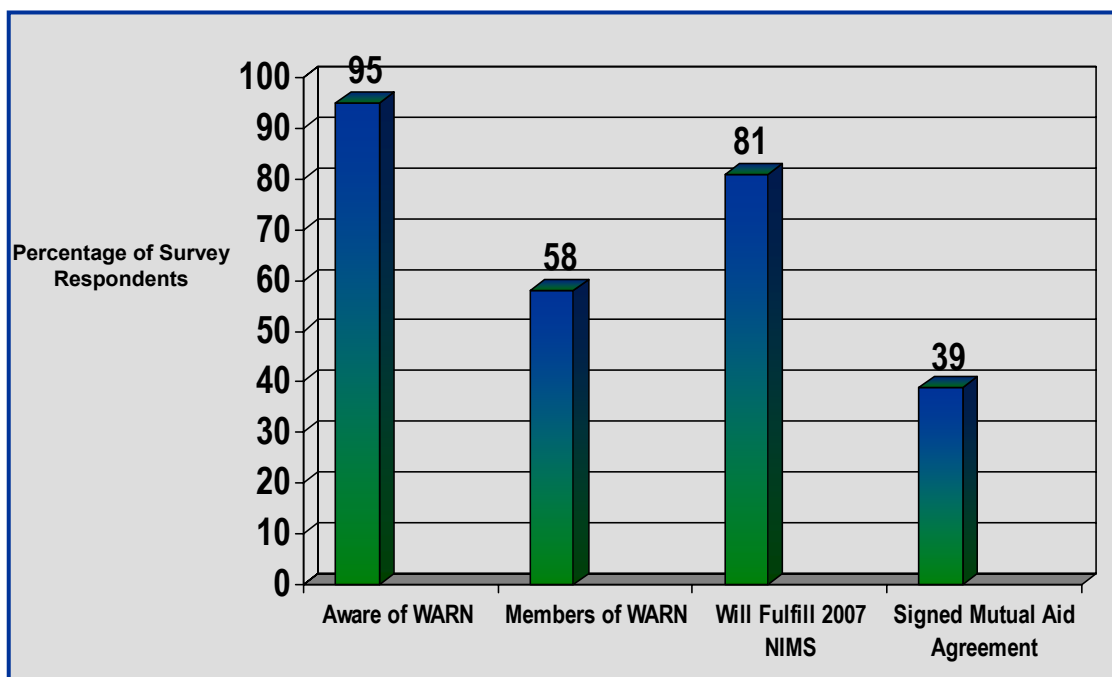


Figure 3: Survey Results – Awareness and Involvement in WARN

Water and Wastewater Utilities, published in January 2008.) In terms of experience, 58% were members of a WARN, and 39% had already signed a mutual aid agreement. This response is significant in confirming that respondents were very aware of WARN.

- For those who not yet signed a mutual aid agreement, the primary reason cited was because the agreement was still under development or being reviewed.

- 26% have a full time emergency manager on staff.
- 100% had an Emergency Response Plan (ERP), with the majority prepared in-house, but in some cases with the assistance of a consultant.

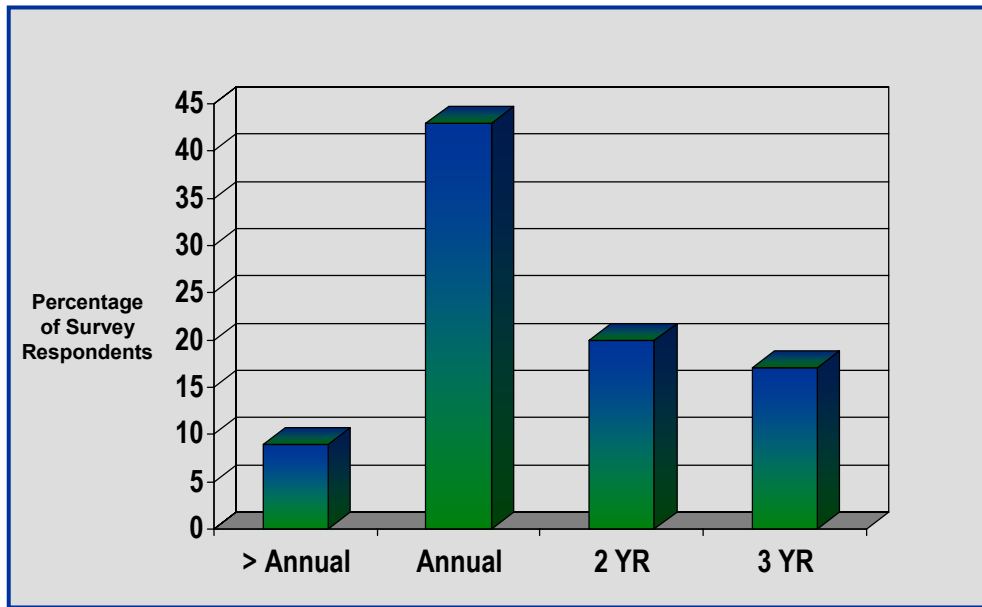


Figure 4: Percentage of Utilities Frequency of Emergency Plan Updates

- 9% update their ERP more frequently than annually, 43% update their plan annually, 20% update their plan every 2 years, 17% update their plan every 3 years.
- 80% of respondents coordinate their emergency response actions with City and/or County Emergency Operations Center(s).

To practice their plan, 55% use a table top exercise, 47% use a table top exercise including organizations outside the utility, 30% use a functional exercise with a simulation team, and 9% use full scale field deployment with equipment.

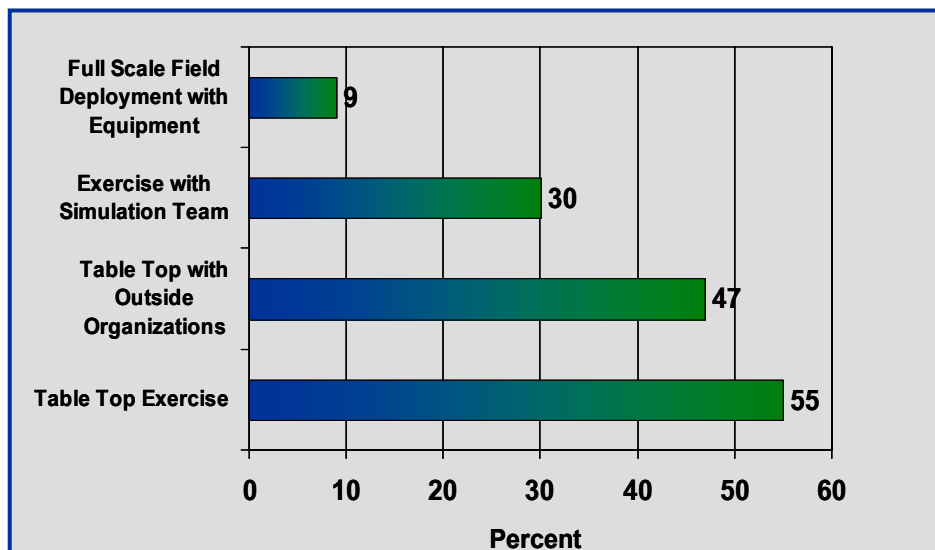


Figure 5: Coordination of Emergency Response with City and/or County

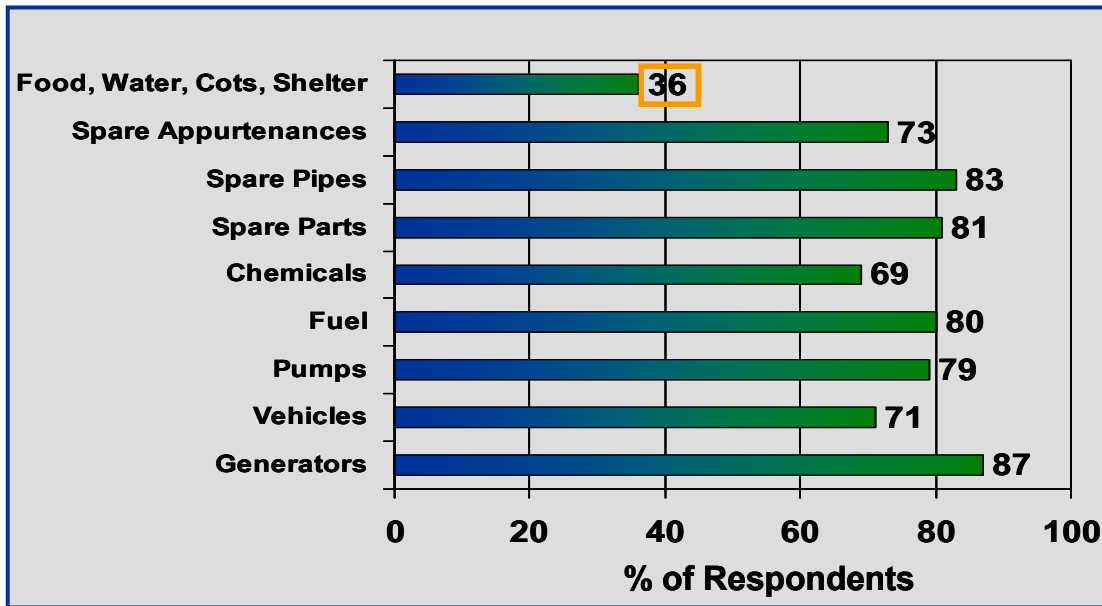


Figure 6: Equipment and Supplies On-hand for Emergencies

- In terms of supplies, 95% keep equipment and supplies on-hand for emergencies. The majority of utilities keep generators (87%), vehicles (71%), pumps (79%), fuel (80%), chemicals (69%), spare mechanical parts (81%), spare pipes (83%), and spare appurtenances (73%) beyond what they need for day-to-day operations. Relatively fewer utilities store staff supplies such as food, water, cots and emergency shelter (36%).
- Of the 38 respondents to the survey who had experienced an emergency in which they requested aid, the most common type of emergency was a wide variety of operational emergencies (38%) such as power outage, source water contamination, major water main break, and lift station flooding. Other emergencies included hurricanes (26%), flooding (13%), tornado (5%), and firestorm (3%).
- 77% of those requesting aid received it in less than 1 day. The vast majority (91%) did not rely on mutual aid or assistance to perform post-emergency assessment phase activities.
- Radio (73%) and cell phone (78%) were the most common methods of communication with other emergency responders. Since most emergencies resulted in complete loss of power, this result is not unexpected. However, some emergencies required the use of land lines, courier, ham radio and fax as the only available means of communication

- TV announcement (75%), radio announcement (72%), newspaper (64%), and website (47%) were the primary means of communication with the public during and after the emergency. These methods were the most popular back-up communication methods as well.
- 82% of 76 respondents had provided mutual aid and/or assistance in the last 20 years. The most common forms were personnel (86%), generators (38%), other equipment (67%), vehicles (49%), other rolling stock (29%), other parts and supplies (35%), and lab services (17%).

Financial aid, fuel, other chemicals and water were less common (all 11% or less).

- 57% of 75 respondents had provided mutual aid and/or assistance that was not part of a state or federal process.
- 18 respondents had provided mutual aid and/or assistance that was part of a state or federal process. 67% reported a good or better experience in getting reimbursed, while 33% reported a poor experience with the need to provide a lot of documentation and/or a long time for reimbursement.

BUSINESS CASE DEVELOPMENT ANALYSIS

Business case analysis involves an evaluation of the projected benefits and costs, as well as the strategic evaluation of the relative worth of the proposal or project.

Benefits typically fall into two broad categories: tangible and intangible. Tangible benefits can be quantified with relative ease and certainty in monetary terms. Intangible benefits are not readily quantifiable but should be considered and weighed in making a decision about joining a WARN and signing a mutual aid agreement. In some cases, intangible benefits may be perceived to outweigh the tangible benefits.

In quantifying benefits and costs, the direct and indirect benefits and costs to the utility were considered. General economic benefits and costs to the region, such as the impact on local business, tourism, etc., were not part of the scope of work but these impacts can be significant.

Tangible Benefits of WARN Participation in Mutual Aid

As part of the survey, respondents indicated the relative worth of the following list of tangible benefits:

- Reduced cost to purchase and maintain back-up portable generation capability. Most utilities do not have on hand all the back-up portable generation

capability needed for their system to fully function under all scenarios. Under a WARN arrangement, utilities can selectively reduce the needed generator equipment with relatively low impact on its ability to meet customer service levels. For example, in 2008, the Florida WARN will receive a \$400,000 grant from the Federal Emergency Management Association for purchase of back-up portable generator purchase. (For more information on emergency power, refer to the AWWA report, *“Emergency Power: Source Planning for Water and Wastewater”*, issued in 2004.) This benefit of reduced generator equipment can be particularly important for utilities with many lift and pump stations such as those in Gulf coastal areas.

- Reduced lost water/wastewater revenue. Loss of revenue for part or all of a service area for one or more days can impact a utility’s financial position. It can also greatly affect the ability of the utility to recover for an extended period of time, such as the Water and Sewerage Board of New Orleans has experienced in the aftermath of Hurricane Katrina.

- Reduced cost of carrying contingency inventory for other supplies and equipment. Most utilities responding to the survey indicated that they did not carry all the inventory needed for emergency response. Storage of such supplies and equipment has a carrying cost that can be estimated.
- Reduced cost to respond to an adverse incident. Utility managers understand that it can be much more cost effective to use back-up generators, supplies and even personnel through mutual aid and/or assistance agreements, rather than purchasing such services in market channels during an emergency event when demand often exceeds supply and pricing is driven accordingly.
- Improved ability to respond to emergencies due to training, lessons learned and experiences exchanged from other WARN participants. The Community of Practice that develops in a WARN program is a significant benefit that utilities have cited. (A Community of Practice is defined as a group of people who come together to share expertise and learn from one another, both face-to-face and virtually.) WARN organizations will typically conduct training workshops and emergency response planning sessions. There are various other cost savings that can be provided by a more timely and effective recovery. For instance, after Hurricane Katrina a large expense and manpower was expended on supplying and distributing first bottled water and then later tanker trucks of water. Reducing the length of time needed to distribute water can free up valuable manpower to concentrate on restoring facilities and improving business continuity issues.

Intangible Benefits of WARN Participation in Mutual Aid

Significant intangible benefits of WARN have been cited by utilities. For utilities that perceived a significant benefit, these intangible benefits included:

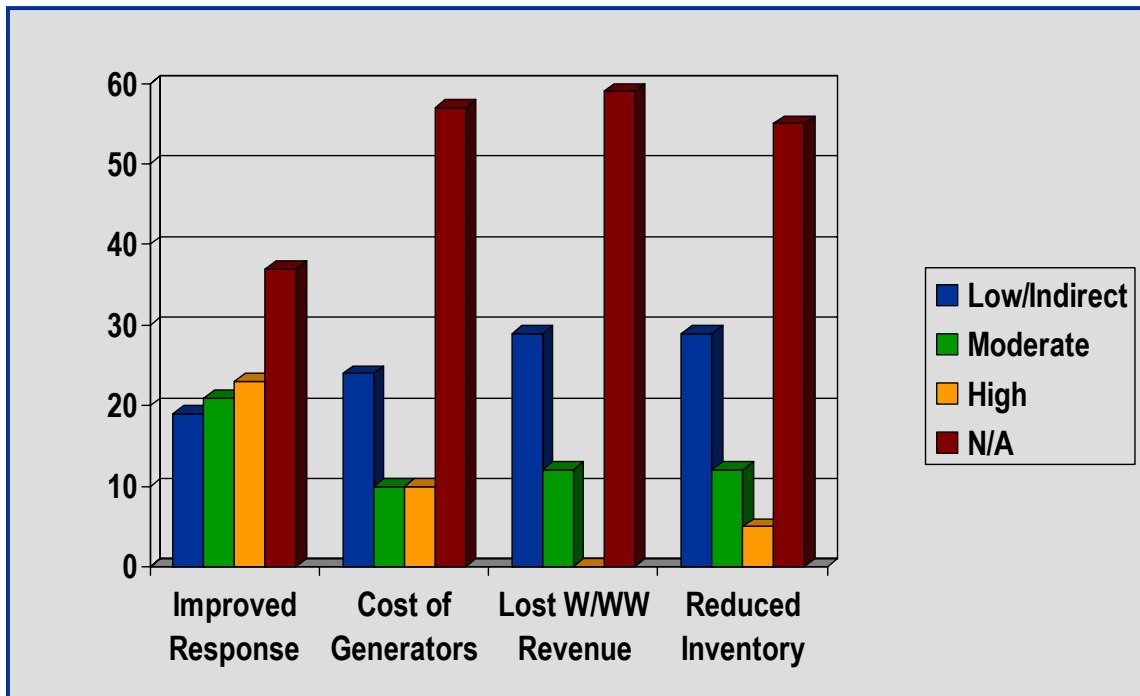


Figure 7: Respondents See the Primary Benefit as Improved Ability to Respond

- Reduced insurance cost. In Texas, the Texas Municipal League (TML) provides insurance to the majority of utilities. TML reports that membership in Texas WARN (TXWARN) is considered as a positive factor in the utilities overall risk assessment for insurance purposes.
- Improved bond rating. Utilities may finance their capital improvement programs with general obligation or revenue bonds. As a greater portion of wastewater revenues are now derived from user charges as compared to ad valorem taxes, revenue bond use has become more common. Financial

condition is one of several factors that the bond rating agencies will consider in rating a general obligation or revenue bond issue. The rating received for the bond directly affects the interest rate and hence debt service costs that the utility will pay. If it is perceived that revenue can be lost and additional expenses incurred due to lack of preparedness for emergency situations based on actual performance or potential events, it can potentially negatively affect bond ratings. There is anecdotal evidence to suggest that bond rating agencies are considering risks and emergency planning and preparedness in their rating process.

- Improved customer satisfaction, public perception and relations with the general public and media. Utilities must be at the forefront of protecting public health and safety, and events that cause loss of water and wastewater services can cause individual impacts and affect the ability of firefighters to respond to fires. Management credibility may be adversely impacted to an extent that they are no longer seen as capable leadership for the organization.

In the survey, it was evident that respondents see the primary benefit as improved ability to respond. This result is not entirely surprising as the utility respondents were, for the most part, moving ahead in participating in WARN, even without a business case.

Reduced cost to respond to an

emergency was perceived by some as a benefit, as well.

Another strong point in favor of participation in a WARN is the requirement, beginning in 2007, for a utility to be NIMS-compliant in order to be eligible for federal grant assistance (refer to AWWA's report, *Security Funding Opportunities: Lessons Learned & Observations from Successful Water and Wastewater Utilities*, published in January 2008.) Further, execution of the mutual aid agreement by WARN participants can help a community satisfy NIMS compliance criteria "Participate in and promote intrastate and interagency mutual aid agreements, to include agreements with the private sector and non-governmental organizations." (Federal Emergency Management Agency, 2008).

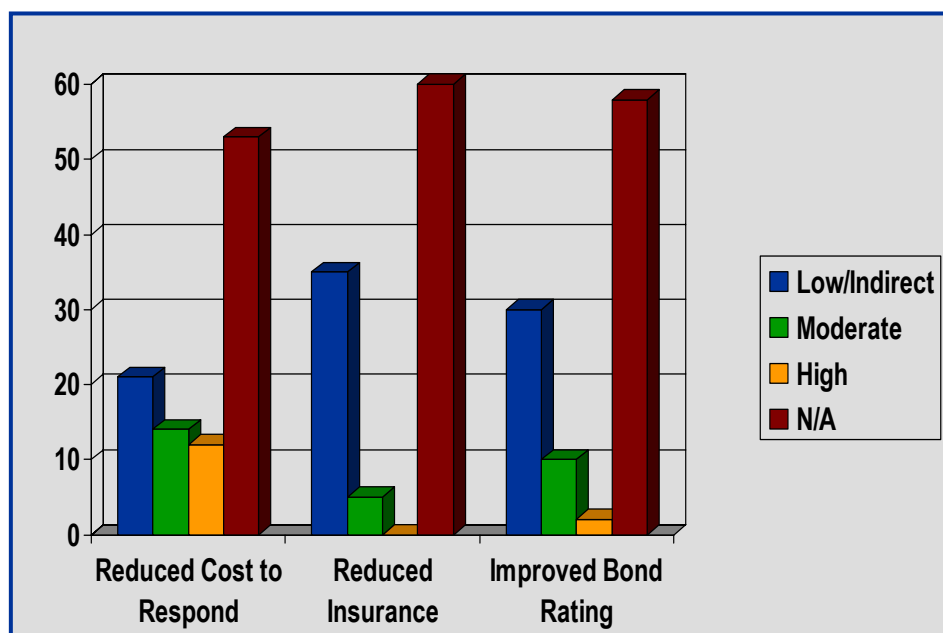


Figure 8: Reduced Cost to Respond was Perceived by Some as a Benefit

In addition, utility managers have commented on the important benefit of a WARN derived from being able to obtain manpower to fill in as the utility's own manpower fatigues or "runs out of gas" during the recovery effort, particularly for larger scale emergencies. Again, this benefit is difficult to quantify but undeniable in aiding recovery.

Also, it is thought by some utility managers that participation in a WARN may provide an affirmative defense and show due diligence on the part of the utility in the event of a lawsuit, or regulatory action arising as a result of a response to an emergency.

Costs of WARN Participation

Costs to participate in a WARN, exclusive of the cost of actually providing mutual aid, includes the following items:

- Staff time to develop/coordinate participation in WARN.
- Legal and planning costs to establish and maintain participation.
- Communication costs such as establishing and maintaining a web site for the WARN, as well as other communication mechanisms including brochures and advertising associated with the program.

- Staff time and possible travel expenses for training to be NIMS certified. Actual training is provided free of charge by the Federal Emergency Management Agency.

The majority of the survey respondents considered these costs to be low.

For most utilities, the biggest cost will be staff time for attending meetings, participating in conference calls, reviewing and in some cases preparing documents, coordination exercises and similar activities. These costs are generally absorbed within the other planning duties of staff responsible for planning and coordinating emergency response and/or operations. Therefore, staff costs can generally be considered sunk costs that would not be part of the business case.

There may some expenses incurred for legal review. For larger utilities, they have generally relied on in-house expertise. For small to medium utilities and some larger utilities, legal expenses will be incurred, particularly in the start-up phases of the WARN organization. These expenses can range from hundreds to thousands of dollars.

Communication costs were also determined to be relatively low for the majority of WARN participants. Utilities may share expenses, or one utility may volunteer to absorb the expense of establishing the web site.

Some states such as Pennsylvania have successfully pursued state grants to establish the web site. Source code is now available from Texas and Florida, so the costs are generally for recoding, hosting and maintaining the web site. Assuming technical staff are available, added costs are generally low, and would be expected to be \$1,000 or less per year.

signatory of the WARN agreement enhances a utility's risk management options by increasing their capability to recover their system following an incident, which ultimately improves the communities they serve.

It is worth noting that utility participation in a WARN should include execution of the mutual aid agreement, i.e., signing the state WARN agreement. Signing the agreement does not obligate the utility to respond to a request for assistance. In addition, being a signatory to the WARN agreement may be required by utilities willing to provide assistance else they are not likely to take the risk of deployment. Therefore, being a

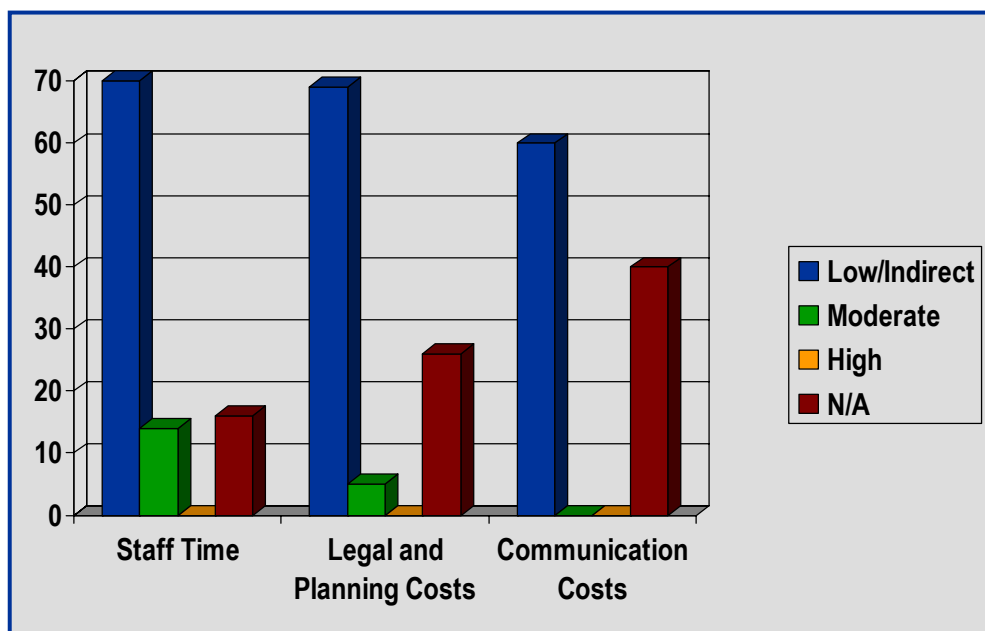


Figure 9: Costs to Participate in a WARN are Perceived as Being Low

APPLICATION TO SELECTED UTILITIES

Example business cases including an estimate of benefits and costs are provided in this section. The examples include different emergency scenarios for different sizes and types of utilities.

Users should have familiarity with the basic concepts of benefit-cost analysis if they desire to develop a financial case for participation in a WARN. Some excellent references for further understanding of such concepts include:

Newman, Donald G. et. al. *Engineering Economic Analysis*, 9th edition. Oxford University Press. 2004.

Selpulveda, Jose et. al. *Schaum's Outline of Engineering Economics*. McGraw Hill. 1984.

Business Case Example 1 – Medium Sized Utility, Operational Emergency

Windy City Utility is located in the upper Midwest. It provides 47,600 customers with water and wastewater service. It operates one water treatment plant, and one main and one very small wastewater treatment plant. The system includes approximately 770 miles of distribution system and 590 miles of collection system, 11 lift stations, two water storage tanks and six wastewater pumping stations.

Source water for the water treatment plant is the Muddy River. During late winter/early spring two years ago, an unusually intense rain storm in the headwaters of the watershed upstream of the plant, combined with the fact that vegetation had not begun to grow, caused very high levels of turbidity in its source water. Its most experienced operator had recently retired, and two lead operators had less than 5 years of experience each. In addition, several filter beds were off line for regular winter maintenance. The combination of high turbidity, lack of filter capacity and relatively inexperienced operations staff caused the Utility to lose the ability to treat water to meet drinking water standards for turbidity. As a result, the Utility issued a boil water notice for the entire service area for three days. This event resulted in a loss of revenue for the system for three days, additional operational costs incurred in getting the system back into service, and investigation by the regulatory agency into its operating procedures.

Windy City Utility is considering joining the state WARN organization that has recently formed. The General Manager has asked for the preparation of a business case to join WARN to present to its Board. In preparing the business case, staff had analyzed the cost to respond to its most recent emergency outlined above, with and without participation in a WARN.

Highlights of benefits and costs that they have identified are as follows (refer to associated spreadsheet):

- **Reduced Revenue Loss:** Windy City Utility lost three days revenue during previous emergency. With local and regional assistance, they believe that they would lose only 1.5 days of revenue with WARN assistance. Annual revenues are \$28.4 million (water and wastewater), so 1.5 days of revenue is equivalent to \$116,712.
- **Reduced Inventory Savings:** This savings is estimated at 5% of total inventory cost of \$1,424,000. At a benefit of 6% per annum on investment of the saved inventory, Windy City Utility would realize \$4,270 in annual savings.
- **Reduced Equipment Cost:** Windy City Utility owns three generators. It would need another eight generators to have complete back-up during a power failure. The annual benefit is estimated to be 20% of \$50,000 per unit for both capital and operations and maintenance of the generators.
- **Reduced Insurance Cost:** Windy City Utility purchases insurance coverage for certain types of risks. Following conversation with their insurer, it estimates that the value of reduced insurance costs benefit will be \$10,000 annually.

- **Improved Bond Rating and Associated Debt Savings:** Although Windy City Utility believes that they are more likely to get a better bond rating as part of a WARN, they already receive the highest bond rating available. Therefore, there is no monetary benefit estimated here.

In terms of cost, Windy City Utility identifies the following costs:

- **Cost to Respond to Emergency:** There may be some reduction in direct cost to respond but it may not be significant. Windy City Utility would reimburse the responding utilities for expenses incurred, such as overtime. Windy City recognizes that it may incur staff costs to respond to an adverse event. However, the costs would be "sunk" labor costs and overtime expenses are reimbursed by the benefiting utility. If mutual aid and assistance is actually provided by the utility as a result of a WARN activation, the costs incurred are reimbursable as defined under the terms of the agreement. (Note that if the utility incurs overtime costs for personnel working at the responding utility because other personnel are away assisting another utility and thus not available, these costs cannot be recovered through the WARN mechanism.)

- **WARN Staff Cost:** No additional staff is required for WARN participation because the required activities can be conducted using existing staff. For this reason, it is considered a sunk cost only.
- **Legal Costs of WARN:** Windy City Utility estimates that it will incur an expense of \$5,000 for start-up review of the mutual aid agreement by their outside counsel.
- **Communication Costs of WARN:** Windy City Utility would incur an annual cost of \$100 annual contribution to help defray hosting and other web site administration expenses.

Business Case Example 2 – Large Utility, Adverse Weather Event

Sunny City Utility Authority (SCUA) is a large Utility providing full water and wastewater services in Florida. This utility has analyzed risks and found that hurricanes are a top-rated risk to the utility. In addition, the Authority's managers are concerned about climate change, and the potential impact of low frequency but high consequence events such as hurricanes. Therefore, the Authority's Board of Directors has asked the staff to prepare an evaluation of the Utility's response capabilities. In this evaluation, the Authority has included an evaluation of participating in the

Florida WARN (FlaWARN) program, the Florida mutual aid and assistance network. SCUA looks at the impact of a Category 3 Hurricane. Such hurricanes occur on average every 5 years in some parts of Florida.

- **Revenue Loss:** SCUA evaluated the potential impact of a single incident. In a typical event, with the assistance of FlaWARN, SCUA would anticipate a loss of revenue of one week due to the effects of felled trees and resulting loss of power and ability to provide water and wastewater service. With the assistance of FlaWARN providing back-up generation capability, SCUA thinks that they would have the service area partially restored (50%) in three days and fully restored in five days. Therefore, the lost revenue is assumed to be equivalent to only three days instead of 7 days, a savings of four days of revenue. Average annual daily revenue is \$500,000.
- In addition, a neighboring large utility's assistance in back office operations, billing, and damage assessment was both valuable and quantifiable in assuring that the SCUA was able to maximize reimbursement from FEMA and expedite the resumption of billing and other administrative functions.

- **Reduced Inventory Savings:** SCUA is able to carry less inventory such as equipment, supplies and fittings for emergency response, knowing that they can be made available through WARN if needed. This savings is estimated at 5% of total water and wastewater equipment and supplies inventory cost of \$3,535,000. At a benefit of 6% per annum on investment of the saved inventory, SCUA would realize \$10,605 in annual savings.
- **Reduced Equipment Cost:** In the case of SCUA, there are 130 water wells serving over 30 water treatment facilities. Even though the bulk of the water treatment facilities and an associated on-site well are served by a stationary generator, it is estimated that 30 to 40 of the remaining 100 well sites would require a portable generator during an extended power outage in order to meet demands in the system. SCUA currently has only 9 standby portable generators available to power the additional 30 to 40 wells that would need power during a major event such as a hurricane. SCUA would look to FlaWARN for those generators during an extended emergency. The capital cost for SCUA to purchase the additional 30+ generators sufficient to power the wells is estimated at over \$3.5 million. The annual cost assuming a working life of 15 years at 5% is

equivalent to \$162,200. In addition, SCUA estimates an annual labor cost of \$60,000 to maintain 40 generators.

- **Wastewater service in the coastal areas of the United States including the Gulf Coast states and the southern Atlantic seaboard is typically provided through a series of pumping systems. These areas have very little topographical relief and rely on pump stations in lieu of gravity flow. SCUA which serves approximately 500 square miles of territory has over 1,150 wastewater pumping stations. Less than 100 of these stations have onsite standby power. The remaining stations depend upon mobile trailer mounted generators for power during a power failure. SCUA keeps approximately 30 standby generators available for use during power failures. It is projected that SCUA would need approximately 140 generators to power the stations on a rotational basis during an extended widespread power outage. The capital cost to purchase the additional 110 portable trailer mounted generators in sizes ranging from 40 to 300 kw is approximately \$5.5 million, not including depreciation or maintenance. The annual cost assuming a working life of 15 years at 5% is equivalent to \$255,000. Estimated annual labor**

cost for maintenance and storage is estimated to be \$120,000.

existing staff. For this reason, it is considered a sunk cost only.

- **Reduced Insurance Cost:** SCUA purchases insurance coverage for certain types of risks. Following conversation with their insurer, it estimates that the value of reduced insurance costs benefit will be \$10,000 annually.
- **Improved Bond Rating and Associated Debt Savings:** Although SCUA believes that being a WARN member will help improve their overall bond rating, they have not calculated an actual economic benefit. In terms of cost, SCUA identifies the following costs.
 - **Cost to Respond to Emergency:** There may be some reduction in direct cost to respond but it may not be significant. SCUA would reimburse the responding utilities for expenses incurred such as overtime. SCUA recognizes that it may incur staff costs to respond to an adverse event. However, the costs would be "sunk" labor costs and overtime expenses are reimbursed by the benefiting Utility.
- **WARN Staff Cost:** No additional staff is required for WARN participation because the required activities can be conducted using
- **Legal Costs of WARN:** SCUA estimates that it will incur an expense of \$2,000 for start-up review of the mutual aid agreement by their outside counsel. Most of the review will be handled by in-house counsel.
- **Communication Costs of WARN:** SCUA would incur an annual cost of \$500 annual contribution to help defray hosting and other web site administration expenses.

CASE STUDY EXAMPLE 1 - WINDY CITY UTILITIES

Scenario: Operational
Emergency Resulting in Loss of
Source Water

Interest Rate for Net Present Value Calculation 6%

	COST CATEGORY													
Benefits	Net Benefit with WARN Assistance	Comments	Frequency of Benefit or Cost	Net Present Value (Calculated)	YR 0	YR 1	YR 2	YRS 3-7*	YR 8	YRS 9-11*	YR 12	YRS 13-15*	YR 16	YRS 17-20*
Estimated difference in system revenue under this scenario	\$116,712	Lost 3 days revenue during previous emergency. Assume only 1.5 days lost with WARN assistance. Annual revenues are \$28.4 million (water and wastewater).	Per occurrence. Assume Year 2, 8, 12, 16.				\$116,712		\$116,712		\$116,712		\$116,712	
Reduced inventory costs (parts, supplies)	\$4,270	Estimated at 5% of total inventory cost of \$1,424,000, 6% per annum	Annual			\$4,270	\$4,270	\$4,270	\$4,270	\$4,270	\$4,270	\$4,270	\$4,270	\$4,270
Reduced cost of owning/operating generators	\$50,000	Windy City Utility owns 3 generators. It would need another 8 generators to have complete back-up during a power failure. The annual benefit is estimated to be 20% of \$50,000 per unit, times 8 units, including capital as well as O&M cost.	Annual			\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Decreased insurance cost	\$10,000	The utility estimates that this benefit will be \$10,000 annually.	Annual			\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Decreased debt service cost (due to bond rating)	\$0	Although Windy City Utility believes that they are more likely to get a better bond rating as part of a WARN, they already receive the highest bond rating available. Therefore, there is no monetary benefit estimated here.												
Improved customer satisfaction	\$0	Priceless but no quantified benefit identified.												
Total Benefits					\$0	\$64,270	\$180,982	\$64,270	\$180,982	\$64,270	\$180,982	\$64,270	\$180,982	\$64,270
Expenses														
Cost to respond to the emergency	\$0	There may be some reduction in direct cost to respond but it may not be significant. Windy City Utility would reimburse the responding utilities for additional expenses incurred such as overtime. These expenses would not be different under a WARN or not. Windy City recognizes that it may incur staff costs to respond to an adverse event. However, the costs would be "sunk" labor costs with the exception of possible overtime expenses at the responding utility to cover for those away responding, which are not reimbursed by the benefiting utility.												
Staff time for WARN Participation	\$0	No additional staff - sunk cost only.												
Legal costs of WARN	\$5,000	\$5,000 for start-up review of the mutual aid agreement.	Year 0		\$5,000									
Communication costs of WARN	\$100	\$100 annual contribution from utility to defray expenses.	Annual			\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
Total Expenses					\$5,000									
Net Benefit (Expense)					\$1,013,217	(5,000)	64,270	180,982	64,270	180,982	64,270	180,982	64,270	64,270

*The columns for these years are identical.

CASE STUDY EXAMPLE 2 - SUNNY CITY UTILITIES AUTHORITY

Scenario: Category 3 Hurricane

Interest Rate for Net Present Value Calculation 6%

	COST CATEGORY							
Benefits	Net Benefit with WARN Assistance	Comments	Frequency of Benefit or Cost	Net Present Value	YR 0	YRS 1-6*	YR 7	YRS 8-20*
Estimated difference in system revenue under this scenario	\$2,000,000	Anticipated net loss of 4 days of revenue at average of \$500K per day.	Per occurrence. Assume Year 7.				\$2,000,000	
Reduced inventory costs (parts, supplies)	\$10,605	Estimated at 5% of total inventory cost of \$3,535,000, 6% per annum	Annual			\$10,605	\$10,605	\$10,605
Reduced cost of owning/operating generators	\$597,200	\$162,200 annual capital cost and \$60,000 O&M cost of water generators. \$255,000 annual capital cost and \$120,000 O&M cost for wastewater generators.	Annual			\$597,200	\$597,200	\$597,200
Decreased insurance cost	\$50,000	The utility estimates that this benefit will be \$50,000 annually.	Annual			\$50,000	\$50,000	\$50,000
Decreased debt service cost (due to bond rating)	\$0	No direct monetary benefit is assumed here.						
Improved customer satisfaction	\$0	Priceless but no quantified benefit identified.						
Total Benefits					0	\$657,805	\$2,657,805	\$657,805
Expenses								
Cost to respond to the emergency	\$0	Similar to Windy City Example 1.						
Staff time for WARN Participation	\$0	No additional staff cost - sunk cost only.						
Legal costs of WARN	\$2,000	\$2,000 for start-up review of the mutual aid agreement.	Year 0		\$2,000			
Communication costs of WARN	\$500	\$500 annual contribution from utility to defray expenses of WARN organization.	Annual			\$500	\$500	\$500
Total Expenses					\$2,000	\$500	\$500	\$500
Net Benefit (Expense)				\$8,867,351	-\$2,000	\$657,305	\$2,657,305	\$657,305

*The columns for these years are identical.

WARN ACTIVATION CASE STUDIES

In addition to the above business case evaluation, three case study examples of benefits from having a WARN were examined.

Case Study 1: Orange County Utilities (OCU), Florida

According to Ray Hanson, Deputy Director of OCU, prior to the creation of FlaWARN, there was no apparent need for such an extensive aid agreement coordination process. The last big storm to hit Florida was the Category 5 Hurricane Donna in 1960. In those days, Orlando was small and Florida had not yet experienced the explosive growth to come. The large metropolitan areas didn't blossom until the 1970s. There were not enough major storm events to cause concern, particularly for utilities in Central Florida so there were no drivers to change the way business was done. Orange County Utilities (OCU) did not exist.

Over time, OCU formed and developed informal mutual aid arrangements with other utilities but nothing more. There was no process to track or manage resource requests nor was there expectation of reimbursement for offering aid. OCU had emergency preparedness plans that were very basic. Improved security processes were being developed in response to issues arising from 9/11. There were some form of aid

agreements in the works prior to 2004, but they were in the formative stages.

In 2004, five hurricanes hit the State in one season - Bonnie, Charley, Frances, Ivan, and Jeanne, with 3 out of 5 impacting the Orlando/Orange County metro area. OCU was virtually unprepared for this previously unimaginable multi-storm scenario. The existing emergency plans did not address a situation like this. OCU was crippled with 75% of approximately 500 pump stations inoperable due to lack of power. Extended loss of power had a major impact on operations. OCU did not have enough generators or staff to service the out-of-service pump stations. OCU had no system for tracking needs, and no extensive contact list to call upon. The Florida Water Environment Association Utility Council quickly drew up a call-list to jump start calls for assistance but that was the extent of the mutual aid response plan.

Hurricane Charley was a small, fast moving storm and OCU was the biggest Utility affected in Central Florida and needed lots of help. The two storms that followed within weeks affected other utilities as well and therefore there was no one available to help because they either staged for the storms with no extra capacity or focused on their own emergency response after the storm.

OCU advised utilities that helped in responding to Hurricane Charley that they would be reimbursed but there was no formal arrangement or statement of costs and liability protection. There was also no guarantee in place that FEMA would reimburse OCU. OCU learned later on that FEMA requires mutual agreements to be in place to provide reimbursement. Luckily, OCU was able to document the process in detail and FEMA did provide reimbursement. The process and paperwork however was daunting.

Managing multiple aid requests was difficult. Adding that task to OCU staff that was already tapped out was too much and ineffective. Coordinating any resources received was also very challenging. The need to book hotels, arrange meals for staff on loan, and coordinate communications with them was totally unanticipated. Luckily, OCU had extra radios for outside teams to cross communicate with staff, which eased the response burden somewhat. Documenting the entire event was a tremendous burden. Thus, obtaining assistance was hard but coordinating it made it double-duty. It would have helped to have a third party involved just to coordinate those efforts.

Thankfully, OCU hasn't yet had a need to utilize the new mutual aid system since 2004. Because of size and location, OCU's emergency management philosophy is to direct our considerable resources toward

becoming self-sufficient and view FlaWARN as an important supplemental assistance provider. Being a member of FlaWARN and able to help other utilities is regarded as an essential community partnership and has provided an unexpected valuable benefit by providing OCU staff the opportunity to train and apply emergency response skills. With staff retirements increasing, FlaWARN membership is also an important contributor to knowledge transfer needs. So, the most important benefit of FlaWARN to OCU is the knowledge gained in terms of sharing emergency response plans and best practices in addition to providing supplemental assistance.

In the southeastern and coastal areas of the U.S., major storms often affect large geographic areas. Storms can impact large areas of Florida and can render any mutual aid system ineffective on a state level. Therefore, FlaWARN should consider broadening and strengthening the FlaWARN "network" to a regional level. This would provide members with the ability to share resources out of state for assistance, as well as expand training and testing preparedness and promote best practices for our staff.

Case Study 2: Detroit, Oregon

The City of Detroit is located in Marion County, Oregon. In February 2008, a 50 year snow storm event occurred in Marion County which stretched local resources. The half-

mile road up to the City water treatment plant was no longer passable or plowable. The area had no power. A propane-powered emergency generator keeping the water treatment plant on line would run out of fuel in a day or so. High snow berms necessitated the use of backhoes which were not available from the County as they were all being deployed elsewhere. Propane delivery was vital and so the Utility was living on borrowed time. Being an Oregon WARN (ORWARN) member, the City contacted ORWARN. Mike Gotterba, the Emergency Manager at the City of Salem and primary ORWARN contact, provided the necessary backhoes for two days, allowing plows to move in and re-open the road for additional propane delivery.

From Christone Pavoni, City Recorder, the City of Detroit, *"There aren't words big enough to thank you for the incredibly quick response in our time of need. The Salem Crew was just awesome! This is just a quick note to thank Mike, the City of Salem, and all those who have called and offered assistance. ORWARN WORKS!!!! Thank you."*

Case Study 3: Alamosa, Colorado

Alamosa is a town with a population of about 10,000, located south of Colorado Springs, Colorado. The Town's drinking water supply comes from groundwater - two water supply wells at a depth of 800 to 1,200 feet

are fed by an aquifer of geothermally heated water that provide water at a temperature ranging from 80 to 90 degrees Fahrenheit. In March 2008, a sharp increase in the number of cases of illnesses was reported by Alamosa residents. The source of the illnesses was not initially known but it was determined fairly quickly that the cause was *salmonella*. Often, *salmonella* illness is caused by contamination in food. However, since over a dozen bottle-fed only babies became sick, Colorado Department of Public Health & Environment (CDPHE) epidemiologists began to suspect contamination of the water supply in mid-March.

On March 19, CDPHE instructed the Town to issue a boil-water notice and called the Colorado Water/Wastewater Agency Response Network (CoWARN) for assistance. CoWARN has a secure web-based event tracking system and provides resources and training for planning and responding to emergencies. CoWARN works with various industry groups and public agencies linked to the Colorado Water community to provide these resources and services.

CoWARN also provides a practical mutual aid agreement designed to reduce bureaucratic red tape in times of emergency. It deals with issues that might delay assistance from a responding utility, including liability and reimbursement. The Town of Alamosa had not signed the mutual aid

agreement, although they were familiar with CoWARN. When informed that CoWARN was willing to help the system recover provided that they follow the provisions outlined in the mutual aid agreement, the Town of Alamosa quickly went about the task of signing the mutual aid agreement.

In response to its communications with the Town of Alamosa, CDPHE asked CoWARN to issue a standby notice to members. Almost immediately thereafter on March 19 CoWARN formally activated to ask members for assistance. Response calls came in almost immediately and within a mere 2 hours, an extensive list of available personnel and equipment was available. The following morning, Denver Water Staff met with CDPHE to prepare a preliminary response plan. The plan comprised two key elements: methods to distribute potable water and a process to troubleshoot and then address the underlying cause of contamination.

To provide potable water, the National Guard brought water tankers and handed out a lot of bottled water. Organizations such as Anheuser Busch and WalMart donated water. WalMart and other suppliers also sold bottled water.

Denver Water sampled both water supply wells as well as in the distribution system. The supply wells had no detectable total coliform (TC),

while TC was detected at five points in the distribution systems. Although it was not conclusive, it indicated that the source of contamination was more likely the distribution system rather than the supply wells; to this date, the source of contamination has not been definitively confirmed. No cross-connection or other contamination point has been identified as the likely source.

Since Alamosa did not chlorinate their drinking water, they did not have trained personnel or supplies to do it. Denver Water, Aurora Water and other responders provided chlorine feed systems, pumps, diffusers (to attach to fire hydrants), day tanks and other equipment to help with flushing the system. Denver Water initially supplied four personnel, which was quickly expanded to 6 crews with up to three people, including personnel from Aurora Water, City of Boulder, and several other utilities. The City of Aurora also provided granular calcium hypochlorite (swimming pool chlorine, or HTH). Other cities, as well as a distributor, provided additional granular calcium hypochlorite.

To disinfect it, the distribution system was flushed with high levels of granular sodium hypochlorite added to achieve 25 ppm for three days, followed by 10 ppm for 24 hours, and then tapering off to achieve 1 to 2 ppm to take a cautious, staged approach. As a result, an unusually large quantity of DPD (N,N'-diethyl-p-phenylenediamine) reagent test

packets that measure free chlorine were also needed. Again, other Colorado utilities as well as a distributor were able to provide the needed packets.

The National Rural Water Association was able to provide assistance as well. They provided a trailer that had been funded by CDPHE in January 2008. Although it had not been fully equipped at that point, it was used as a Command Center. Because the trailer is intended to be used primarily as a training vehicle, communication equipment and computers will be added to make it fully usable as a Command Center as well in the future.

The drinking water system was cleared on April 9, to provide potable water without restrictions. During the incident, schools, businesses and residents had a hard time functioning. Many of the response crews actually stayed seventeen miles out of town because of lack of showers and drinking water in Alamosa.

The benefits of CoWARN have been clearly demonstrated. Resources were able to be mobilized very quickly with WARN, once the mutual aid agreement was executed by Town officials. It is believed that it would have taken weeks longer to get the Alamosa system running again without CoWARN. Denver Water and other utilities were able to respond completely and confidently with the mutual aid agreement in place, knowing that liability was not an

issue. The Town of Alamosa will reimburse the utilities as requested, primarily for supplies. The responding utilities donated a large amount of staff time, fuel, and lodging expenses. Since the Town of Alamosa incident, many more utilities have executed the mutual aid agreement after seeing the clear benefits that it brings. (Membership almost doubled in the following 8 to 10 weeks, increasing from 33 to 61 utility members.)

CONCLUSIONS AND RECOMMENDATIONS

This project has shown that the biggest purely economic benefit to a utility from being a member of a WARN is a faster recovery from the emergency and the corresponding revenue gain. However, for some utilities, savings on generators and other equipment and supplies could also be substantial.

In addition, it has been determined that costs to participate in WARN are low. Further, costs for a utility to respond to an event are generally recoverable through the WARN mechanism as permitted in the mutual aid agreement.

Perhaps most important to the utility, there is the issue of public confidence – hard to quantify monetarily but huge in terms of benefit. Lack of potable water has direct economic consequences to the businesses and residences that a utility serves. If a utility loses its reputation and the public's confidence to provide service, the ability to regain such trust again is a challenging, expensive and long-term proposition.

The decision to participate in a WARN, as well as an evaluation of benefits and costs, involves considering a variety of scenarios. These scenarios range from higher frequency but more limited events such as loss of water due to power failure, localized flooding or water main break, to lower frequency but more widespread events such as may

be caused by a hurricane, snowstorm, earthquake or tornado. The need for planning for more frequent events should not be overlooked by the utility manager.

Part of this planning includes execution of the mutual aid agreement so as not to delay the arrival of aid when needed. WARN members will require the execution of this agreement before providing aid due to the protections and assurances it provides the requesting and responding utility. A utility that does not sign the mutual aid and assistance agreement puts their utility and community at risk for delaying the recovery of their operations.

Participation in WARN should be a core element of any utilities overall business continuity strategy and risk management program. The costs are relatively small and the benefits, both to the utility and to the community it serves, are large.

RESOURCES

AWWA (January 2008) *Security Funding Opportunities: Lessons Learned & Observations from Successful Water and Wastewater Utilities*- Report provides information on security project funding opportunities.

AWWA (2004) *Emergency Power: Source Planning for Water and Wastewater* - Report provides information on emergency power.

Federal Emergency Management Agency FY 2008 NIMS Compliance Objectives. Summary chart available at www.fema.gov.

Newman, Donald G. et al, 2004. Engineering Economic Analysis, 9th edition. *Oxford University Press*.

Selpulveda, Jose et al, 1984. Schaum's Outline of Engineering Economics. *McGraw Hill*.

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ECONOMIC BENEFITS OF FORMING AND PARTICIPATING IN A WATER/WASTEWATER AGENCY RESPONSE NETWORK (WARN)

APPENDIX A

AWWA WARN Survey to Develop Business Case

Survey Status: **Active** Launched: 5/22/2007 2:52 PM Closed: N/A

Email Invites: 0

Visits: 281

Partials: 0

Completes: 79 *(Does not include blank responses)*

Since March 2006, the national success of creating Water Wastewater Agency Response Networks (WARN) in each state is undeniable. Last year at this time, four states (California, Florida, Louisiana and Texas) were the only states to have a viable agreement in place as a method of exchanging personnel, equipment and other resources during response to an emergency. Since then, three states (Oregon, South Carolina and Georgia) have executed agreements to form a WARN program, with 12 more states close behind in various states of "readiness" with draft agreements. While the success is evident, and the request for creating more is present, the business case, integration and practicality need to be documented.

AWWA is conducting a study to establish the value of WARN to utilities. As part of this study, this survey is designed to:

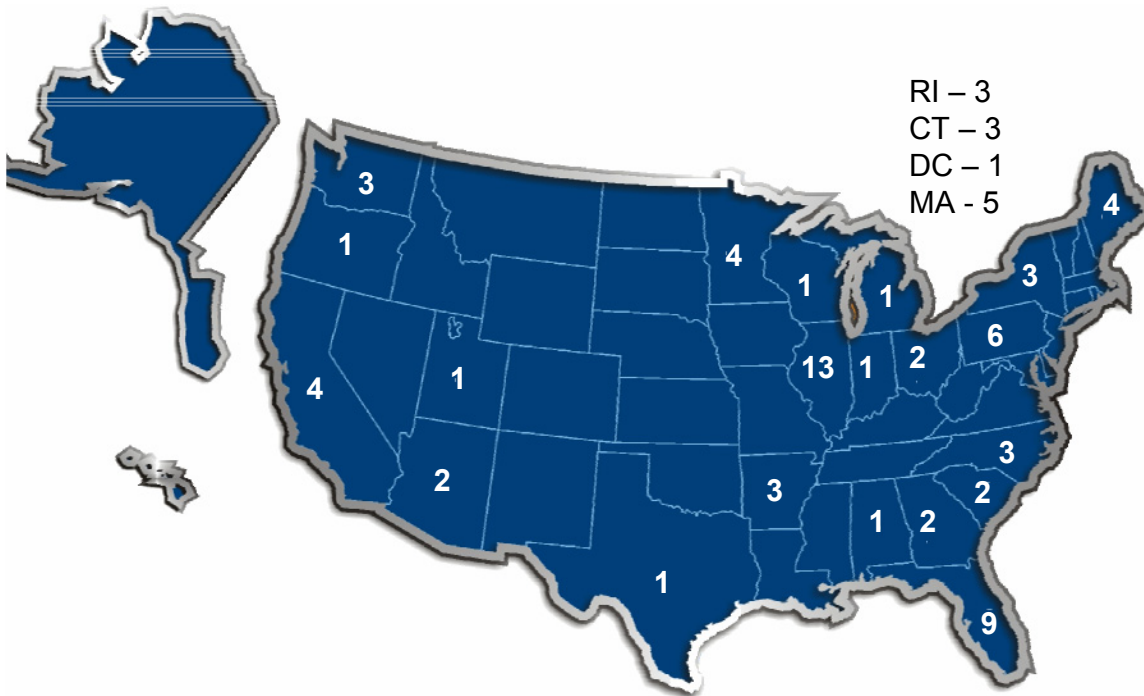
1. Obtain sufficient information to be able to clarify the business case for utilities to participate in WARN.
2. Characterize the economic impact on utilities as they prepare for and respond to emergencies using mutual aid and assistance.

The survey will require approximately 20-30 minutes to complete. There are ten questions related to utility characteristics so we can do cross-correlations. NOTE to Survey Participants: Information to answer questions 2 through 6 may be available by consulting your latest Comprehensive Annual Financial Report (CAFR), budget, or other similar financial document.







1. Contact Information (please fill in the blanks)

[View 79 Responses](#)








AWWA Survey Responders Locations



2. Governance (please check one):

Public Agency owned by a government, non-enterprise (i.e., part of a Public Works Department or other governmental department, etc.)		9	12%
Public Agency owned by a government that is an enterprise fund (i.e., water utility department, sewer utility, etc.)		39	50%
Public Agency with independent governance (i.e., an authority, a regional agency such as a district, etc.)		23	29%
Investor Owned Utility		1	1%
Private Not-For-Profit Utility		2	3%
Other, please specify View Responses		4	5%
Total		78	100%

3. Core Services Provided (check all that apply):

Potable Water Treatment		62	82%
Potable Water Distribution		68	89%
Raw Water Transmission (wholesale)		12	16%
Wastewater Collection		44	58%
Wastewater Treatment		37	49%
Reclaimed Water Treatment		7	9%
Reclaimed/Irrigation Water Distribution		7	9%
Core services Provided by a Private Contractor		0	0%

4. Other Services Provided (check all that apply):

Stormwater Collection		20	61%
Stormwater Treatment		5	15%
Electric Generation		8	24%
Electric Distribution		7	21%
Natural Gas Distribution		2	6%
Solid Waste Collection		10	30%
Solid Waste Transfer/Disposal		4	12%
Other, please describe: View Responses		6	18%

1. District energy (high and low pressure steam).
2. Administrative services for other utilities.
3. Potable water wholesales.
4. Street light billing.
5. By contract.
6. Combined sewer overflow treatment.

5. Population Served (Sum of Wholesale and Retail Services)

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Less than 10,000	10,001 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 to 499,999	500,000 to 999,999	1,000,000 or more	N/A
Water	8 11%	24 33%	12 17%	11 15%	7 10%	5 7%	4 6%	1 1%
Wastewater	8 16%	15 31%	4 8%	10 20%	2 4%	3 6%	2 4%	5 10%
Reclaimed Water	5 24%	0 0%	0 0%	2 10%	0 0%	0 0%	0 0%	14 67%

6. Wholesale Accounts (your agency bills directly to communities or utilities)						
Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Less than 5	5 to 10	11 to 25	26 to 50	More than 50	N/A
Water	39 57%	8 12%	3 4%	1 1%	1 1%	17 25%
Wastewater	22 51%	1 2%	0 0%	2 5%	0 0%	18 42%
Reclaimed Water	6 24%	0 0%	0 0%	0 0%	0 0%	19 76%

7. Total Retail and Commercial/Industrial Accounts								
Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Less than 10,000	10,001 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 to 499,999	500,000 to 999,999	1,000,000 or more	N/A
Water	29 40%	28 38%	7 10%	4 5%	2 3%	0 0%	0 0%	3 4%
Wastewater	23 45%	16 31%	2 4%	2 4%	1 2%	0 0%	0 0%	7 14%
Reclaimed Water	9 32%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	19 68%

8. Most Recent Year Annual Operating Revenue obtained principally from water and sewer service charges (\$'000):									
Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Less than 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	More than 500,000	N/A
Water	15 22%	9 13%	11 16%	9 13%	5 7%	2 3%	3 4%	13 19%	1 1%
Wastewater	12 25%	4 8%	9 19%	3 6%	1 2%	1 2%	3 6%	9 19%	6 12%
Reclaimed Water	5 21%	0 0%	0 0%	1 4%	0 0%	0 0%	0 0%	0 0%	18 75%

9. WATER System Characteristics

[View 73 Responses](#)

Ground Water (Yes or No)	Surface Water (Yes or No)	Number of WTP or Prod. Facilities	Number of Wells	Total Average Daily Water Production (mgd)	List Average Daily Flow Treated at Up to Three Largest WTP- 1	List of Average Daily Flow Treated at Up to Three Largest WTP- 2	List Average Daily Flow Treated at Up to Three Largest WTP- 3	Total Number of Pump & Storage Stations	Length of Water Distribution System (Miles)	Total Service Area in Square Miles (Retail Only)
yes	no	1	15	7	4.5			7	190	12
yes	no	1	13	2.2	2.2			7	70	9.98
no	yes	1	8	10				3	560	
no	yes	1	8	11	11					
no	no									
no	yes	1		55	55			8	1400	380
no	yes	0	5	0	0	0	0	4	100.2	9.5
no	yes	1	19	17		17		5	785	
no	yes	1	19	17			17	5	785	
no	yes	2	11	13	12.5	700,000		5	522	63
	yes		3	20				20	750	45
no	yes	1	0	3.25	3.75			3	130	
no	yes	1	0	9.4	9.4	9.4	9.4	3	190	
no	yes	2	5	2.8	2.8	2.8	2.8	17	205	65
yes	no	1	4	1	1			3	74	22
yes		2	0	9.375	8.84	536		4	330	25
no	yes	1		9	9			5	120	
yes	no	1	3	0.7	0.7			7	400	200
yes	no	2	0	12	11	1	0	40	550	22
no	yes								1016	
	yes			4.8					200	13.4
no	yes	6	32	243	300			150	6630	540
no	yes	1		5.2	5.2			4	230	16
no	yes	2	7	4.7	4.7			4	198	5
no	yes	1		38	17			70	1701	2100
yes	no	5	7	1.3	1.2	1.3	1.3	11	65	
no	yes	5	0	210	125	35	25	133	4085	325
no	yes	1	0	16	16			5	182	
no	yes	1		47	47			1		
	yes			7					217	15
yes	no		20					7	260	
	yes	1		2.8				5	70	20
yes	yes	8	34	89	17	15	15	3	1700	
no	yes	2	8	45	45	45	45	7	800	40
yes	no	1	3	350	350			2	25	2
no	yes	3	37	100	100			110	2083	143.3
yes	no	0	18	9.5	0	0	0	26	18	16
no	yes	1	0	5.3	5.3			9	224	16
no	yes	1	0	1.6	1.6	1.9	1.6	3	50	20
yes	yes	2	5	3.17	0.5	3		5	119.5	12
yes		1	23	6	3	3		5	250	38
no	yes	1	10	22				4	500	49
no	yes	2	0	49.5	37	12.5		71	778	58.3
yes	yes	0	2	2	0	0	0	2	8	0
no	yes	1		3	3			0	130	68
no	yes	2	0	0	23			13	555	25
no	yes	0		2				2	112	15
yes	no	0	7	3.5				3.5	12	6
yes	no	0	8	12 n/a				10	350	35
	yes	3	0	52.5	70	40	12	5	1500	1250
no	yes	4	0	250	75	75	60	22	5000	640
no	yes	1	0	1	1				4	75
no	yes	1	2	0.25	0.25			2	16	53
no	yes	2	0	40	40				30	1800
	yes	0	4	2.8				7	85	6
yes	no	39	22	28	4	2.8	2.5	66	200	28
no	yes	1	9	36	36			29	1332	430
no	yes	1	0	250	250			20	300	
no	yes	9	11	55	35	6	6	25	1500	
no	yes	1	10	30	30			39	747	47
no	yes	4	20	50	18	6	5	13	825	103
yes	no	1	6	3.5	3.5			1	200	8
no	yes	2	11	13	12	1		4	515	48
	no	1	30	3.5				1	98	3.43
no	yes	1		5.2	5.2			4	230	12
yes	no	5	7	1.5	1.5	1.5	1.5	11		
no	yes	1	10	32				6	487.5	60
no	yes	0	5	0	0	0	0	10	100	10
	yes	1						9	81	
yes	no	4	8	2.9	1.14	0.84	0.58	4	91	5
no	yes	1	0	74	64			15	937	72
yes	no	2	37	50.6	50.6	50.6	50.6	10	753	34
no	yes	4	0	207.5	121.5	59.5	26.4	22	2900	

10. WASTEWATER System Characteristics
[View 48 Responses](#)

Number of Wastewater Treatment Plants	Total Average Daily Flow Treated (MGD)	List Average Daily Flow Treated at Up to Three Largest WTP-1	List of Average Daily Flow Treated at Up to Three Largest WTP-2	List Average Daily Flow Treated at Up to Three Largest WTP-3	Length of WW Collection System (Miles)	Total Number of Pump (Lift) Stations	Total Service Area in Square Miles (Retail Only)
1	2.5	2.5			80	9	9.98
1	8.5				450	31	
2	22.6	22	0.6		637	185	
1	4	4	4	4	166	7	9
1	13	50			350	21	15
2	16.5	6.6	9.9		375	30	
1	1	1			60	7	7
1	20	20					
2	9	8	1	0	230	9	12
					1,448		
1	7				200	12	13.4
3	190.3	190.3			4696	29	518
2	14.5	9	5.5		190	13	16
1	1.3	1.36	1.3	1.3	70	19	
1	82	82	0			15	83
0	0	0	0	0	0	15	3
					493	25	30
0					29	2	
2	24	24	24	24	550	4	40
0	0	0	0	0	0	0	0
2	6.4	6.1	0.3		185	6	16
0					50	3	20
1	10	10	0	0	300	36	120
0							
1	3.5	3.5			120	20	68
1	2.9					71	6
1	12	12			300	10	35
4	70	60	5	4	1400	55	1250
1	0.27				12	4	53
2	30			30	1800	125	
1	2.8				90	5	6
0					100	0	28
2	28	28			950	69	430
1	350	350			250	5	
0	0	0	0	0	0	0	0
	44	44			774	29	47
1	0.17				30	14	5
1	2.7	2.7			180	72	8
1	1.7				16.2	40	3.43
2	10.4	5.5	4.9		195	13	12
1	1.6	1.6	1.6	1.6		16	
1	36				400	125	60
1	4.1	0	0	0	166	7	10
2	1.8	1.8			60	23	
2	2.2	1.6	0.6		80	31	5
1	38	38	38	38	516	150	30
1	94.4	94.4			2800	33	


11. Please add any clarifying comments:

[View 23 Responses](#)

1. Wastewater is handled by a separate government agency.
2. Flow includes .04 MGD (average) from neighboring community.
3. We are a state agency that regulates drinking water systems.
4. Water is municipal site (city); wastewater is a county site.
5. Highly fluctuating water demands; 2 MGD in the winter months and 6-7 MGD during the summer tourist season (population served rises to about 100,000).
6. Water is different from wastewater on many questions above. You are getting answers from water with a knowledge of wastewater.
7. We are a drinking water only, rural water system – not-for-profit.
8. The City of EP is also served by a second WWTF operated by a state corporation.
9. Didn't understand the difference between list avg daily flow at up to three largest WTP/WWTP (1-3). And for water, it's the sum production of all the water treatment plants.
10. Out S Slope WWTP is a regional facility, which receives waste stream from Coal Valley, East Moline, Rock Island County, in addition to Moline.
11. BWD is a wholesale potable water supplier only with no retail customers. Our customers provide their own transmission facilities from our plant to their distribution systems.
12. I am answering these ww questions as a transporter of waste to the regional treatment plant (owned by others). While we have several small, remote treatment plants, and collection systems, I am not including them in the response for simplicity sake. I am including relief facilities to the main interceptor.
13. Note: Primary supply surface water with 200 MGD capacity. Only treatment is disinfection and pH adjustment. (Unfiltered system) 100 MGD groundwater backup system.
14. All water is purchased.
15. We are a ground water system. The only treatment we do is the addition of chlorine and fluoride.
16. The Mars Hill Utility District provides municipal water and sewer to approximately 600 users. The towns of Mars Hill and Blaine are included in their District's boundaries. A small portion of the Town of Westfield is also served with municipal water.
17. These responses are based upon Raleigh Public Utilities.
18. The Village receives and distributes Lake Michigan water from the DuPage Water Com. Wastewater is collected and transmitted to one plant for treatment and release.
19. Wastewater collection system only. All wastewater flow and is treated by the City of San Bernardino.
20. None.
21. This response includes data for Moline's municipally owned wastewater system, which also supports development of a WARN in Illinois.
22. Mundelein purchases water from the Central Lake County Joint Action Water Agency, which is then distributed to our customers.
23. #9, 6 tanks at two plants, plus two elected storage tanks off-site with pumps. #10. 381 miles gravity; 135 miles force.

The following six questions relate to WARN/Mutual Aid Participation:

12. Are you aware of the WARN program or effort in your state?

Yes		73	95%
No		4	5%
Total		77	100%



13. Are you a member of the WARN program?






Yes		44	58%
No		32	42%
Total		76	100%

14. If your state WARN program or effort has a website, please indicate how useful it is:

Very Useful		17	29%
Somewhat Useful		6	10%
Not Useful at All		1	2%
Still Under Development		24	41%
No Opinion		10	17%
Total		58	100%

15. Have you signed a mutual aid agreement?



Yes		30	39%
No		46	61%
Total		76	100%

16. If you responded "no" to the previous question, why not? (check all that apply):			
Legal Concerns		4	9%
Political Concerns		1	2%
Financial Concerns		0	0%
Final Agreement not Available Yet		28	60%
Don't Know		1	2%
Other, please describe View Responses		19	40%

1. Still in process of setting up WARN.
2. We are in development stage of WARN program.
3. We are the backup to many communities that can no a.
4. Draft currently being circulated for comments.
5. Not yet available – we will consider it.
6. Starting the process to receive permission.
7. The process is just being initiated in this state.
8. Just becoming aware of IL WARN efforts.
9. Not available – being developed.
10. PA WARN is still in the developmental stage.
11. Our state is presently working on a WARN program.
12. Working thru process now. Will sign by July '07.
13. Just received it, solicitor is reviewing it.
14. This is the first time that I have heard of WARN.
15. I am the WI WARN start-up committee chair.
16. WARN system in Maine is still in development.
17. There isn't one.
18. Just recently got involved. Don't know enough yet.
19. Need to obtain City Council approval.

The next eighteen questions relate to your Emergency Planning Experience:




17. Do you have a full time emergency manager on staff within the utility?

Yes		20	26%
No		57	74%
Total		77	100%

18. Do you have an Emergency Operations, Emergency Response or Emergency Preparedness Plan?


Yes		77	100%
No		0	0%
Total		77	100%







19. How was your plan prepared? (check all that apply):



In-House		64	83%
Consultant		30	39%
Other, please describe: View Responses		5	6%





1. In-house & consultant on portions.
2. In-house and Consultant Partnership.
3. Both in-house and a consultant.
4. In-house with assistance on graphics by consultant.
5. Fire Chief, Committee, County.



20. Do you periodically update your utility's emergency plan?





Yes		74	97%
No		2	3%
Total		76	100%



21. If you responded "yes" to the previous question, how often?			
Less than 1 year		7	9%
1 year		32	43%
2 years		15	20%
3 years		13	17%
4 years		3	4%
5 years		5	7%
Total		75	100%






22. Do you periodically practice your plan using a tabletop approach conducted internally within the utility?			
Yes		42	55%
No		35	45%
Total		77	100%



23. If you responded "yes" to the previous question, how often?			
More frequently than once per year		6	14%
Once per year		24	57%
Once each two years		6	14%
Once each three years		6	14%
Once each four years		0	0%
Once each five years		0	0%
Total		42	100%

24. Do you periodically practice your plan using a tabletop approach involving organizations outside the utility?			
Yes		36	47%
No		40	53%
Total		76	100%







25. If you responded "yes" to the previous question, how often?			
More frequently than once per year		2	6%
Once per year		15	42%
Once each two years		11	31%
Once each three years		8	22%
Once each four years		0	0%
Once each five years		0	0%
Total		36	100%

26. Do you periodically practice your plan using a Functional Exercise (uses a simulation team to simulate an event) approach?			
Yes		23	30%
No		54	70%
Total		77	100%



27. If you responded "yes" to the previous question, how often?			
More frequently than once per year		0	0%
Once per year		10	43%
Once each two years		4	17%
Once each three years		7	30%
Once each four years		1	4%
Once each five years		1	4%
Total		23	100%

28. Do you periodically practice your plan using a full-scale exercise approach (actually deploys equipment into the field to a specific scene(s) to take field action)?			
Yes		7	9%
No		68	91%
Total		75	100%

29. If you responded "yes" to the previous question, how often?






More frequently than once per year		0	0%
Once per year		2	25%
Once each two years		3	38%
Once each three years		2	25%
Once each four years		1	12%
Once each five years		0	0%
Total		8	100%

30. Do you regularly keep equipment and supplies on hand for emergencies (beyond what you need for day-to-day operations or just in time stock)?



Yes		71	95%
No		4	5%
Total		75	100%



31. Check all of the equipment and supplies you keep on hand:

Generators		65	87%
Vehicles		53	71%
Pumps		59	79%
Other equipment		38	51%
Fuel		60	80%
Additional storage for fuel		19	25%
Chemicals		52	69%
Additional storage for chemicals		11	15%
Spare mechanical parts		61	81%
Spare pipes		62	83%
Spare appurtenances		55	73%
Staff support supplies such as water, food, cots, emergency shelter		27	36%

32. With whom do you coordinate emergency planning to ensure adequate supplies for emergencies? (check all that apply):			
Meet with neighboring utilities on a periodic basis		18	27%
Coordinate through a City or County Emergency Operations Center		53	80%
State primacy agency (e.g. Department of Health)		15	23%
Coordinate through WARN organization		10	15%
Other, please specify: View Responses		13	20%









1. Village of Mundelein.
2. No one.
3. NY WARN is under development.
4. Not done at this time.
5. Participate in the Cal. Utilities Emerg. Assoc.
6. FEMA
7. None.
8. Utility manager & key personnel.
9. Vendors of all descriptions.
10. We stock many "spare parts" for emergencies.
11. State mutual aid network; local emergency agencies.
12. Du Page County PWMA
13. Nothing formal – call for assistance.

33. For your most critical facilities, do you have remote monitoring SCADA capability?			
Yes		67	88%
No		9	12%
Total		76	100%

34. If you responded "yes" to the previous question, is it useful during emergencies?			
Yes		65	98%
No		1	2%
Total		66	100%

The next questions relate to your most recent Emergency Response experience for which you requested aid (regardless of whether you are an official WARN member). If you have not had an Emergency Response experience, please skip to Question 43.

35. For your most recent emergency for which you requested aid, which type of emergency did you experience?












Earthquake		0	0%
Hurricane		10	26%
Flooding		5	13%
Blizzard		0	0%
Fire/Firestorm		1	3%
Domestic Terrorism		0	0%
Tornado		2	5%
Other, please describe: View Responses		20	53%
Total		38	100%

1. No aid requested in memory.
2. Power outage.
3. No aid requested.
4. Water contamination.
5. Major water line break.
6. Wide spread power outage.
7. Lift station flooding.
8. Main break on a 36" Water Main.
9. Electrical fire.
10. Wind storm.
11. High turbidity of raw water.
12. We have been able to handle our own emergencies.
13. N/A
14. No water.
15. Water main disruption.
16. Have not required outside aid as of yet.
17. Blackout.
18. Transmission main break.
19. Water main break.
20. Lift station flooded.



36. For the emergency listed above indicate for each item the length of time it took to receive the initial aid response. Please check all that apply (if you did not request aid, select N/A):



Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Less than one day	1 to 2 days	2 to 3 days	3 to 4 days	More than 4 days	N/A
Neighboring Utilities, City or County Government	19 58%	4 12%	1 3%	0 0%	1 3%	8 24%
Regional Organization	3 11%	2 7%	0 0%	0 0%	1 4%	21 78%
State-Wide Organization	2 7%	6 21%	0 0%	0 0%	1 3%	20 69%
Federal Aid (e.g., FEMA)	0 0%	1 3%	2 7%	0 0%	7 24%	19 66%






37. Please indicate the type of aid (check all that apply):

Financial		10	31%
Personnel		12	38%
Generators		5	16%
Other Equipment		15	47%
Vehicles		6	19%
Other Rolling Stock		2	6%
Fuel		1	3%
Chemicals Other Than Fuel		0	0%
Other Parts and Supplies		4	12%
Lab Services		3	9%
Other Services		3	9%
Other, please describe: View Responses		10	31%

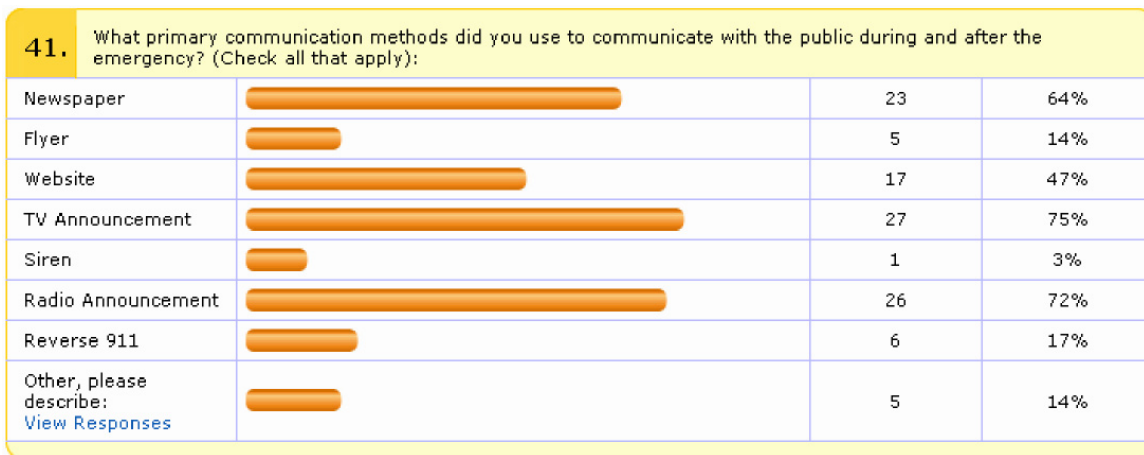
1	crew and vehicles equipped with Dist. tools
2	open interconnects
3	Support services for personnel
4	We needed a valve that is not stocked.
5	It takes awhile to process claim
6	Treated water through an interconnect agreement
7	WE have requested and received Fed reimbursement
8	Potable Water in Water Buffaloes
9	Alternate source of water
10	Debris removal assistance

38.	If Federal Aid was selected, was it a public assistance program?		
Yes		4	20%
No		16	80%
Total		20	100%

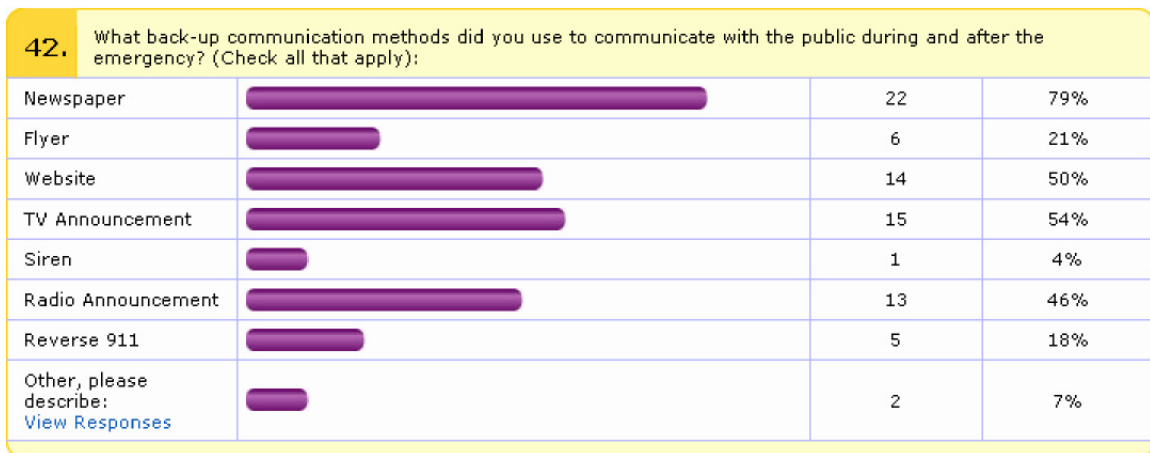
39.	Did you rely on mutual aid or assistance to perform post-emergency assessment phase activities?		
Yes		3	9%
No		31	91%
Total		34	100%

40.	How did you communicate with other emergency responders during the emergency response? (Check all the apply):		
Radio		27	73%
Cell Phone		29	78%
Email		16	43%
Satellite Phone		5	14%
Other, please describe: View Responses		9	24%

1. One land line was the only one working.
2. Direct communication.
3. Land line telephone.
4. Land line phone.
5. Fax
6. Land line phones.
7. Courier and ham radio.
8. Other radio systems.
9. Internet website for FlaWARN.





1. Neighborhood spreading messages.
2. No communication necessary.
3. Community sign.
4. District news letter.
5. Maintained visibility, opened our office to public.















1. N/A
2. Code Red communication system (like reverse 911).



43. In the last 20 years, have you provided aid to those who experienced emergencies?

Yes		62	82%
No		14	18%
Total		76	100%



44. If you responded "yes" to the above question, please select from the list below (check all that apply):




Financial		5	8%
Personnel		54	86%
Generators		24	38%
Other Equipment		42	67%
Vehicles		31	49%
Other Rolling Stock		18	29%
Fuel		7	11%
Chemicals Other Than Fuel		6	10%
Other Parts and Supplies		22	35%
Lab Services		11	17%
Other Services		6	10%
Other, please describe: View Responses		14	22%





1. Leak detection, line locates, plant start-up.
2. Field testing.
3. Administrative services, billing, etc.
4. Open interconnects.
5. Water
6. Specialized teams and equipment.
7. Water through emergency interconnects.
8. Engineering
9. Fleet, security, ICS task force and strike teams.
10. Water
11. Potable water.
12. Potable water to neighboring utilities.
13. Debris removal.
14. Personal contact in South Florida.

45.	Have you had any enforcement actions such as notice of violation, consent orders, administrative orders, administrative penalty orders or judicial orders as a result of a response to a previous emergency?		
Yes		1	1%
No		73	99%
Total		74	100%



46.	If you responded "yes" to the previous question, please briefly describe:
0 Responses	



47.	Are you familiar with the National Incident Management System (See NIMS compliance matrix at http://www.awwa.org/Advocacy/Govtaff/Advocacy/Documents/NIMS_Tribal_Local.pdf)?		
Yes		72	95%
No		4	5%
Total		76	100%





48.	Have you fulfilled or do you intend to fulfill the 2007 National Incident Management System compliance requirements?		
Yes		62	81%
No		4	5%
Not Sure - Need more information		11	14%
Total		77	100%



49.	Whom do you rely on for routine fleet maintenance?		
Utility Staff		37	49%
Another Branch of Local Government		24	32%
Private Sector		18	24%
Other, please describe: View Responses		6	8%

1	State Motor Pool
2	Public Works Department - Vehicle Mt. Division
3	Master Mechanic on staff works with contractor
4	vendors
5	Utility divisions are within Public Works Dept.
6	private company at our own maintenance facility




50.	Have you provided mutual aid or assistance that was not part of a state or federal process?		
Yes		43	57%
No		32	43%
Total		75	100%

51.	Has your utility provided mutual aid or assistance through a state or federal process?		
Yes		18	24%
No		57	76%
Total		75	100%

52.	If you responded "yes" to the previous question, what has been your experience in getting reimbursed?		
Excellent; no problems		2	11%
Very Good; with any issues being easy to resolve		6	33%
Good; some issues that were worked out		4	22%
Poor; had to provide a lot of documentation and wait a long time for reimbursement		6	33%
Total		18	100%

53.	Have you provided mutual aid or assistance through the Emergency Management Assistance Compact (EMAC)?		
Yes		5	7%
No		69	93%
Total		74	100%

54. If you responded "yes" to the previous question, what has been your experience in getting reimbursed?

Excellent; no problems		2	40%
Very Good; with any issues being easy to resolve		2	40%
Good; some issues that were worked out		0	0%
Poor; had to provide a lot of documentation and wait a long time for reimbursement		1	20%
Total		5	100%

Business Case for Participating in a WARN. If you responded "yes" to being a member of the WARN program or effort in your state, please respond to the following questions. If you responded "no", please skip to Question 61.



55. What benefits have you received from participating in a WARN? (indicate whether Low/Indirect, Moderate, or High Level of Benefit on those that apply; else choose N/A)

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Low/Indirect Benefit	Moderate Benefit	High Level of Benefit	N/A
Improved ability to respond to emergencies due to training, lessons learned and experience from other WARN participants	8 19%	9 21%	10 23%	16 37%
Reduced capital cost to purchase and maintain back-up portable generation capability	10 24%	4 10%	4 10%	24 57%
Reduced lost water/wastewater revenue	12 29%	5 12%	0 0%	24 59%
Reduced cost of carrying contingency inventory for other supplies and equipment	12 29%	5 12%	2 5%	23 55%
Reduced cost to respond to an adverse event (streamlined procedural steps, reduced provision of alternate water supplies, housing for personnel)	9 21%	6 14%	5 12%	23 53%
Reduced insurance costs	14 35%	2 5%	0 0%	24 60%
Improved bond rating	12 30%	4 10%	1 2%	23 58%
Improved customer satisfaction/ public perception/communication with the general public and the media	6 14%	11 26%	4 10%	21 50%



56. What costs have you incurred from participating in a WARN? (Note these costs include administration, planning and preparation and are not intended to include actual emergency response costs) (indicate whether Low, Medium, or High Cost on all that apply; else select N/A)

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Low Cost	Medium Cost	High Cost	N/A
Staff time to develop/coordinate participation in WARN	30 70%	6 14%	0 0%	7 16%
Legal and planning costs to establish and maintain WARN	29 69%	2 5%	0 0%	11 26%
Communication costs (such as establishing and maintaining a website) that the utility incurred to establish a WARN	25 60%	0 0%	0 0%	17 40%

57. Have you completed an evaluation of the costs and benefits of participating in a WARN?

Yes		1	2%
No		44	98%
Total		45	100%

58. Are you willing to participate in providing a case study that would require an estimated 4 to 8 hours of your time to prepare and provide financial analyses? If "YES", we appreciate your willingness and you will be contacted.



Yes		18	35%
No		33	65%
Total		51	100%

59. Please add any clarifying comments:

[View 18 Responses](#)

1	The answers I have given are based on organizing and running a volunteer water restoration effort for a neighboring community, and working for a responder. We are in the preliminary stages of developing Minnesota WARN.
2	The WARN Program in North Carolina is under development. Greenville Utilities is a member of several other mutual aid organizations through Electricities, State Municipal Mutual Aid Agreement and the NC Eastern Water & Wastewater Mutual Aid Network.
3	we have just recently joined SCWARN, so would have limited experiences or data to share at this time. However, ask after this hurricane season is over, we might have had more experience at that time.
4	Have yet to experience in a case study eligible response. WARN in Illinois is still being developed.
5	Prior to WARN this we participated in a mutual aid agreement with 20 other cities in South Carolina. That system was working well.
6	But, no experience yet. ORWARN is only 45 day old.
7	Only minor incidents have occurred so would be of little service to the process. Can contact me to clarify.

8	Seven water utilities in Southern Maine (serving over 1/3 million people) have entered into a (written) Mutual Aid Agreement, of which our utility is a member. I can submit a copy to you if you so desire.
9	Please contact the City's DPW Commissioner.
10	As to question 58, I would need more detail before I answer yes as I would be committing resources other than myself.
11	I say yes if I can be of assistance.
12	We are just in the formative stages for AZ Warn. There is much work to do but it will happen.
13	Our state is just now forming a VWARN. WE are participating in the process. We have participated in an EMAC deployment. We could talk about that.
14	We are only the second signatory in Pa and have no track record as of yet.
15	No only because we are just beginning to form our WARN. So, no real experience yet.
16	Have not experienced an emergency that required mutual aid
17	Reference to Question 60: We are currently under contract for a seismic vulnerability study which will estimate economic costs of such a disaster
18	In Illinois, we are including Public Works in addition to utilities. To do otherwise is very short sighted, as many utilities fall under a Public Works Department, rather than being a separate agency.

60. Have you estimated the economic cost to your community for lack of service during an emergency?			
Yes		6	11%
No		48	89%
Total		54	100%

Business Case for Participating in a WARN. If you responded "no" to being a member of the WARN program or effort in your state, please respond to the following questions.

61. What benefits might you receive from participating in a WARN? (Indicate whether Low/Indirect, Moderate, or High Level of Benefit on those that apply; else choose N/A)

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Low/Indirect Benefit	Moderate Benefit	High Level of Benefit	N/A
Improved ability to respond to emergencies due to training, lessons learned and experience from other WARN participants	5 10%	20 41%	21 43%	3 6%
Reduced capital cost to purchase and maintain back-up portable generation capability	20 41%	16 33%	7 14%	6 12%
Reduced lost water/wastewater revenue	25 51%	9 18%	9 18%	6 12%
Reduced cost of carrying contingency inventory for other supplies and equipment	17 35%	19 40%	5 10%	7 15%
Reduced cost to respond to an adverse event (streamlined procedural steps, reduced provision of alternate water supplies, housing for personnel)	10 20%	25 51%	8 16%	6 12%
Reduced insurance costs	23 49%	10 21%	6 13%	8 17%
Improved bond rating	22 48%	9 20%	6 13%	9 20%
Improved customer satisfaction/ public perception/communication with the general public and the media	6 12%	21 43%	17 35%	5 10%

62. What costs might you incur from participating in a WARN? (Note these costs include administration, planning and preparation and are not intended to include actual emergency response costs) (Indicate whether Low, Medium, or High Cost on all that apply; else select N/A)

Top number is the count of respondents selecting the option. Bottom % is percent of the total respondents selecting the option.	Low Cost	Medium Cost	High Cost	N/A
Staff time to develop/coordinate participation in WARN	23 43%	24 44%	4 7%	3 6%
Legal and planning costs to establish and maintain WARN	30 58%	19 37%	0 0%	3 6%
Communication costs (such as establishing and maintaining a website) that the utility incurred to establish a WARN	31 58%	17 32%	3 6%	2 4%